

**Predistortion Circuit and Method for Compensating Linear  
Distortion in a Digital RF Communications Transmitter**

**Abstract of the Disclosure**

5           A digital communications transmitter (100) includes a  
digital linear-and-nonlinear predistortion section (200) to  
compensate for linear and nonlinear distortion introduced by  
transmitter-analog components (120). A direct-digital-  
downconversion section (300) generates a complex digital  
10   return-data stream (254) from the analog components (120)  
without introducing quadrature imbalance. A relatively low  
resolution exhibited by the return-data stream (254) is  
effectively increased through arithmetic processing. Linear  
distortion is first compensated using adaptive techniques with  
15   an equalizer (246) positioned in the forward-data stream (112).  
Nonlinear distortion is then compensated using adaptive  
techniques with a plurality of equalizers (226) that filter a  
plurality of orthogonal, higher-ordered-basis functions (214)  
generated from the forward-data stream (112). The filtered-  
20   basis functions are combined together and subtracted from the  
forward-data stream (112).